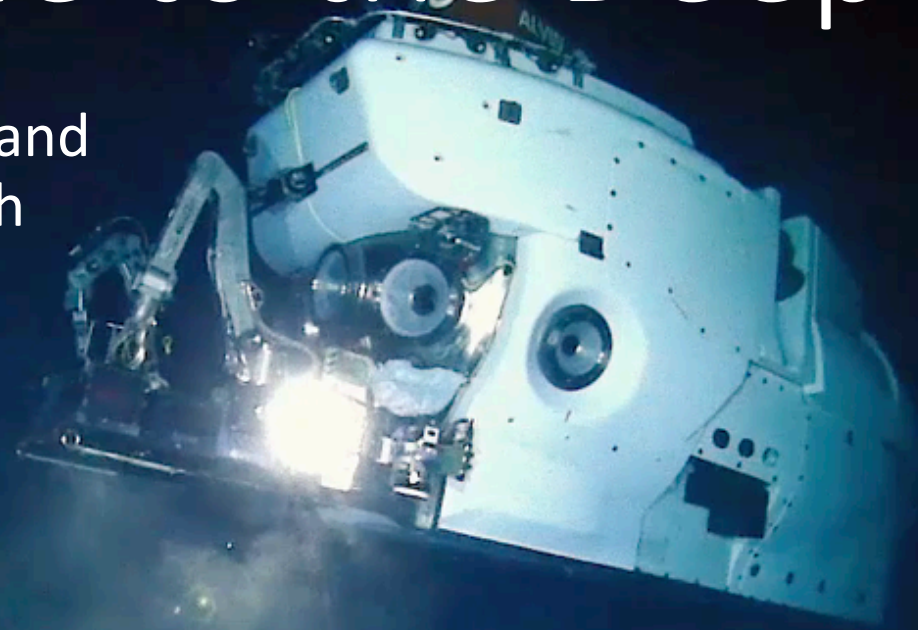


# Welcome to the Deep Sea

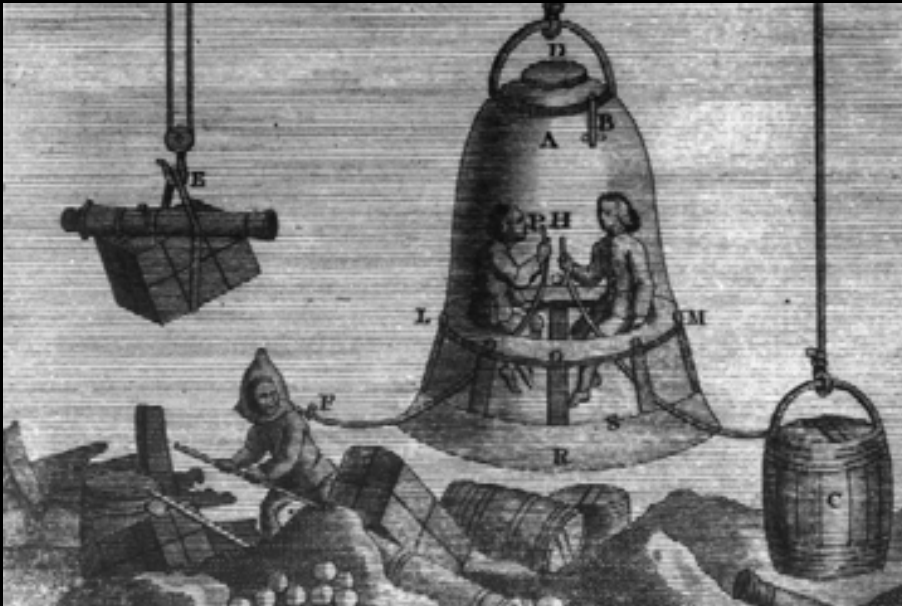
A brief introduction to past and  
present deep sea research



Dorsey Wanless  
Boise State University  
DeSSC New Users Workshop 2019

# Brief History of Ocean Exploration

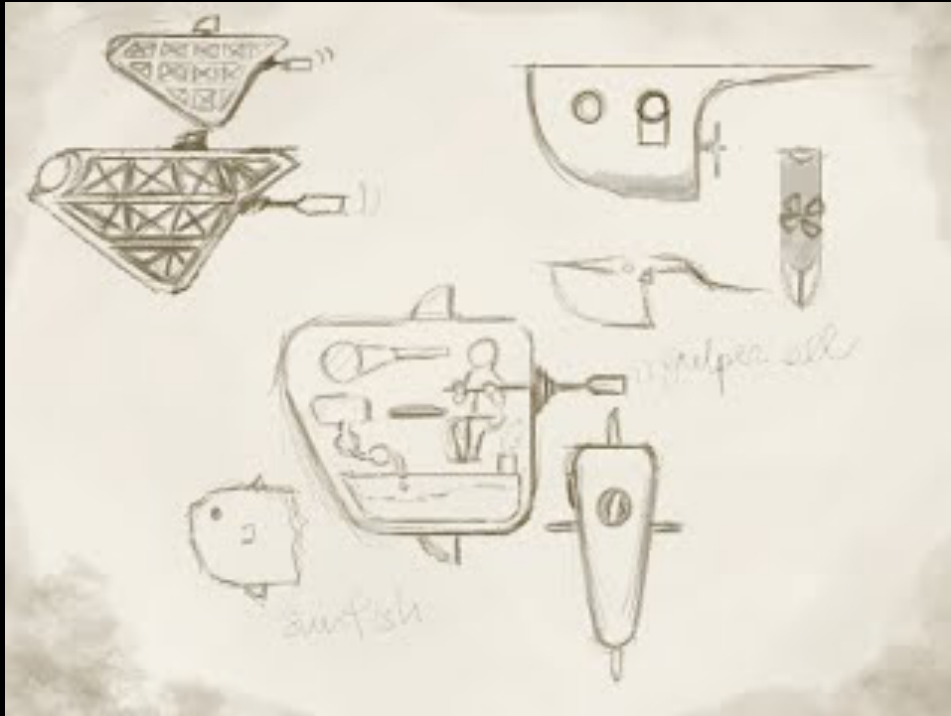
Aristotle: "They enable the divers to respire equally well by letting down a cauldron, for this does not fill with water, but retains the air, for it is forced straight down into the water."



16<sup>th</sup> Century painting of Alexander the Great being lowered in a glass diving bell

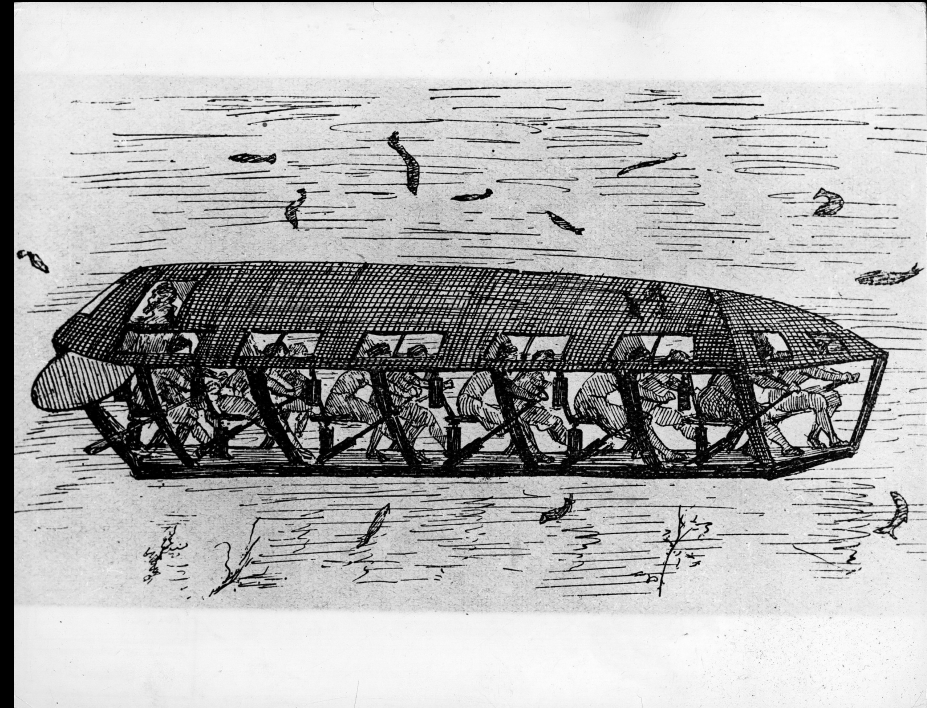
# Early Ideas for Submarines

The first known drawing of submarines were produced by da Vinci ~500 years ago.



At least 14 different submarine designs were patented by 1727

Cornelius van Drebbel (a Dutch Inventor) was the first to actually build a submarine 1620



It completed several journey's on the Thames River at a depth of 12- 15 feet

John Lethbridges diving machine (1715)

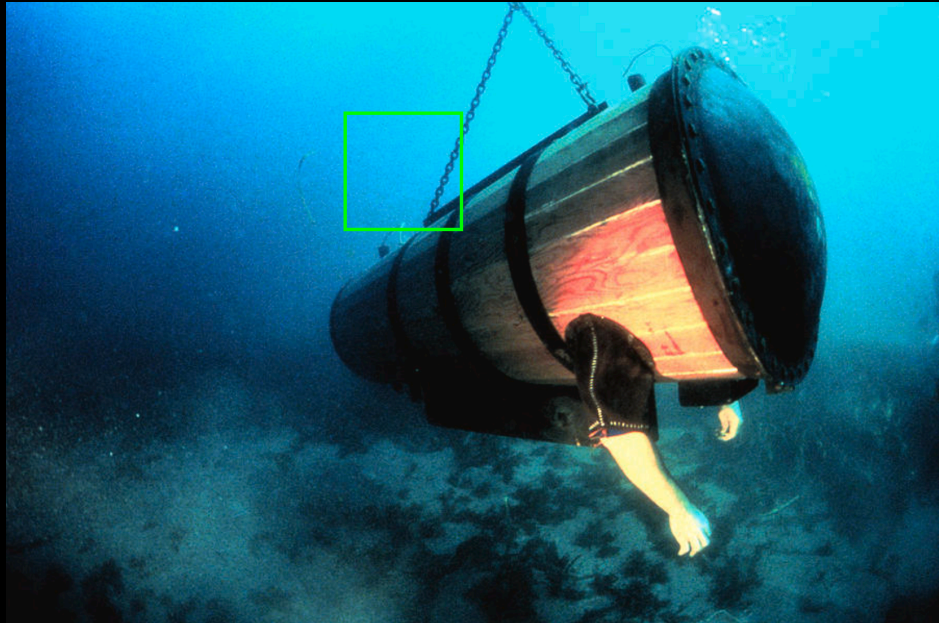


Photo:NOAA

The Turtle (1776) – first submarine used during a war



L:Portrait of Ezra Lee, Turtle's operator R: Cutaway replica at the Oceanographic Museum, Monaco.Photo Zenit CC BY-SA 3.0

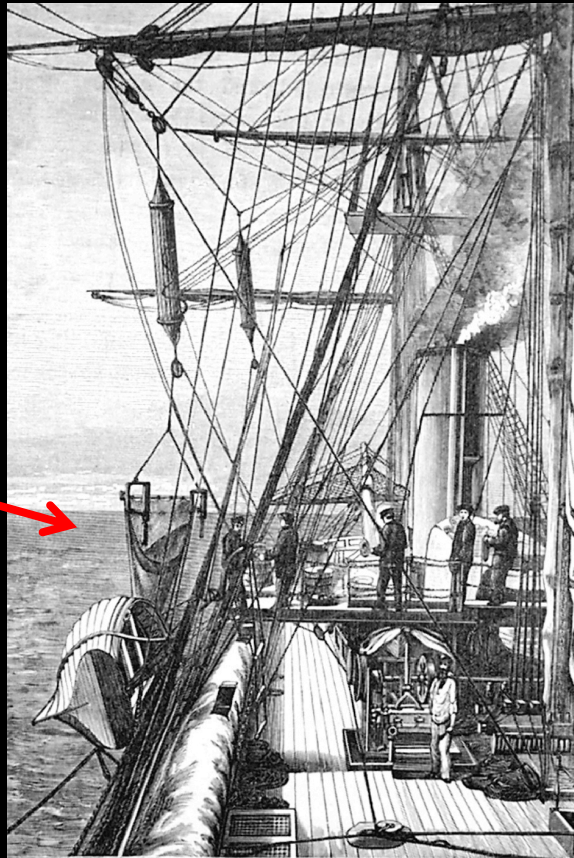
# HMS Challenger



1872 – 1876 First scientific expedition organized to gather data about a wide range of scientific features and processes (temperature, chemistry, water depths, currents, and marine life).

362 sampling sites

Drawing of a dredging apparatus



"At first when the dredge came up, every man and boy who could possibly slip away, crowded round it, to see what had been fished up."

-Professor Moseley in "Notes of a Naturalist" on the Challenger, p. 501.

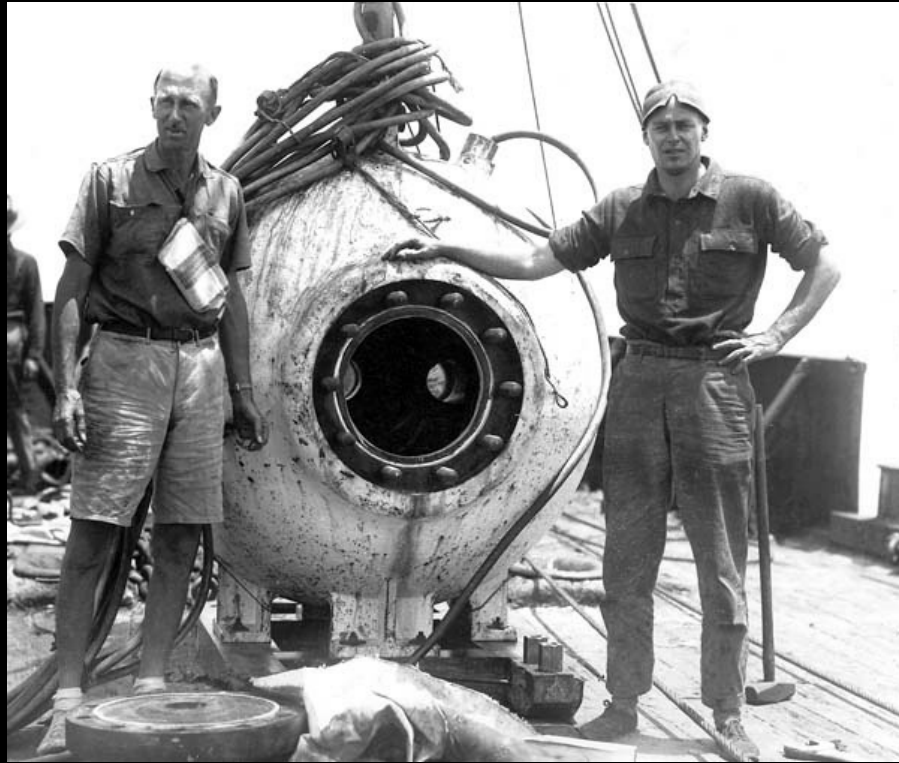
Bathymetric Map of North Atlantic by Sir John Murray



Made the first systematic attempt to chart the basins of the worlds oceans (492 bottom soundings)

# The Bathysphere (1932)

## William Beebe and Otis Barton



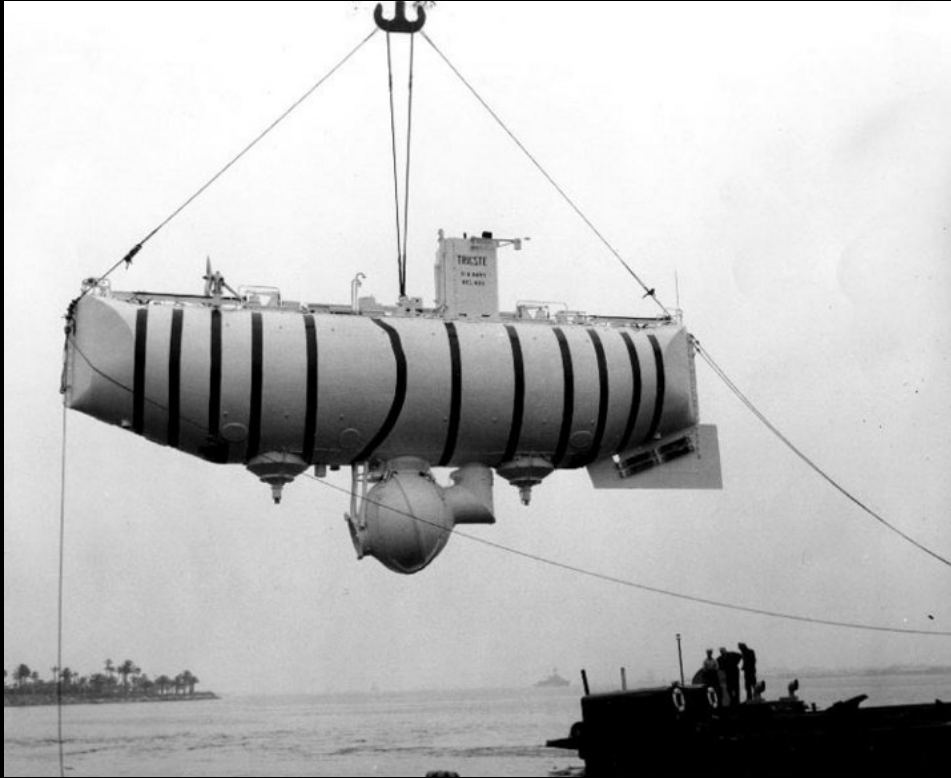
[www.oceanographerschoice.com](http://www.oceanographerschoice.com)



Drawing by Estelle Bostelmann (National Geographic) of two young viper fish as observed by Beebe and Barton from their bathysphere in the depths off Bermuda (1932).

©National Geographic Society; Illustration by E. Bostelmann.

# Bathyscaphye Trieste (1960's)



Don Walsh and Jacques Piccard dove to 10,915 in the Challenger Deep.

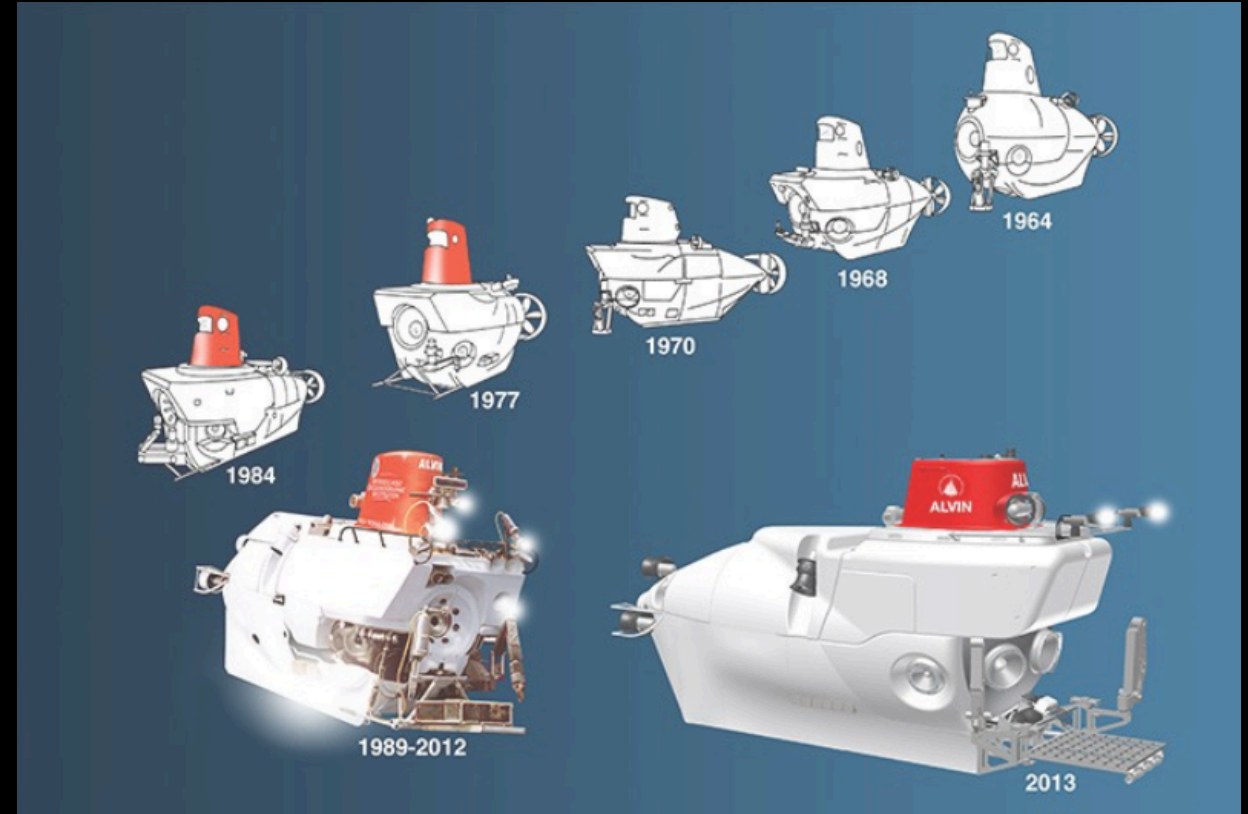


# Alvin Submersible 1964 ... to present



Alvin

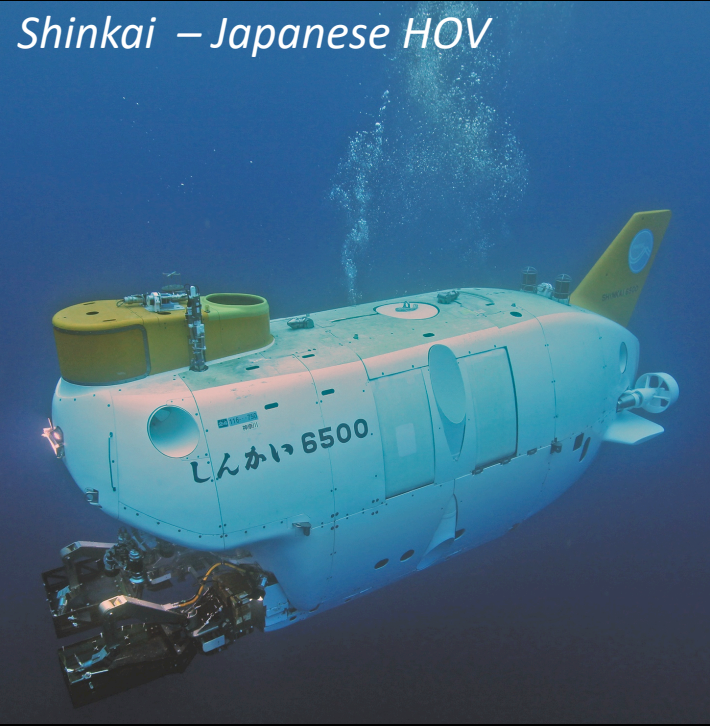
Photo: WHOI



# Human Occupied Vehicles



French HOV *Nautille*



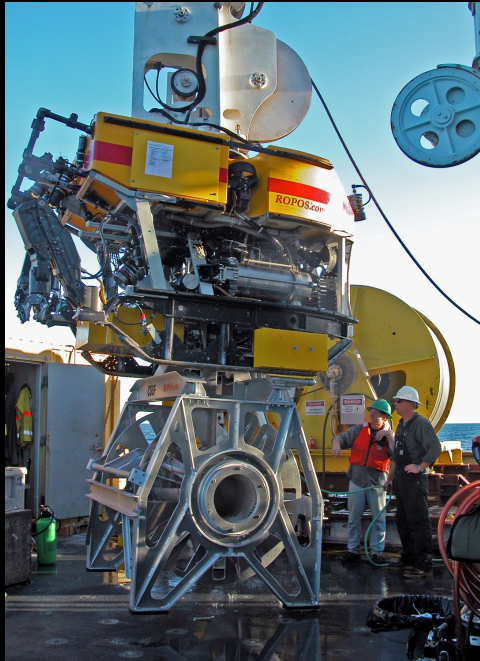
*Shinkai – Japanese HOV*

Alvin Submersible

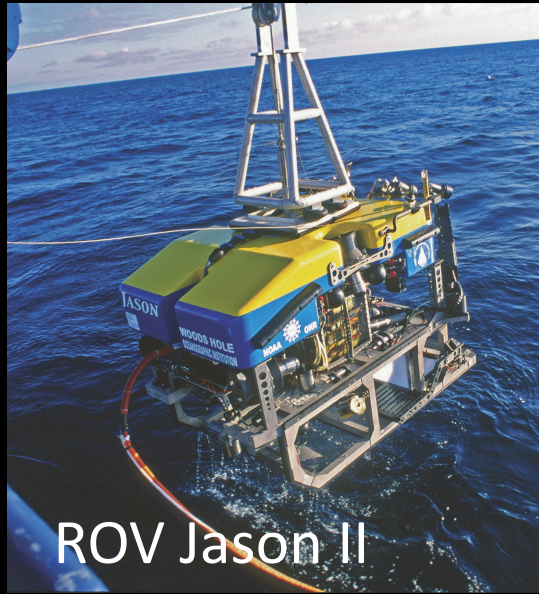
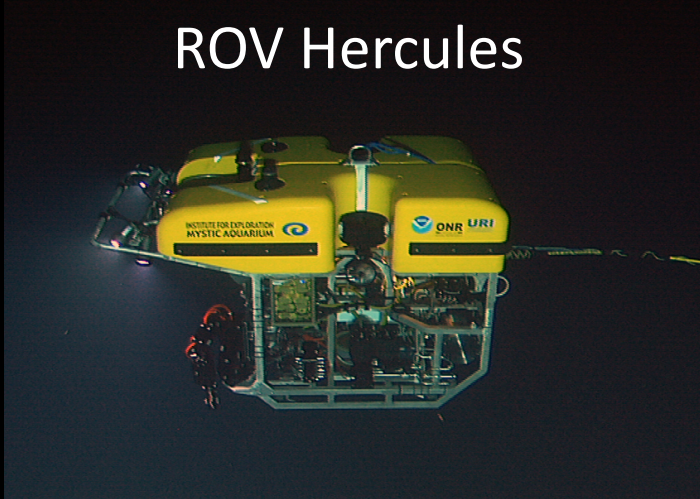


Russian *MIR II*

ROV ROPOS



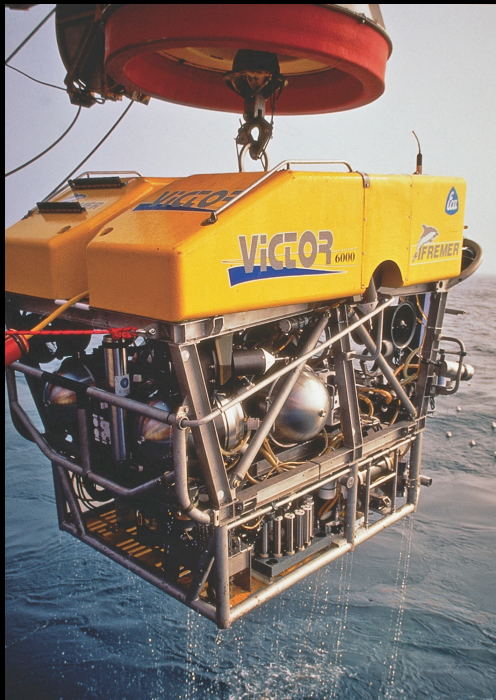
ROV Hercules



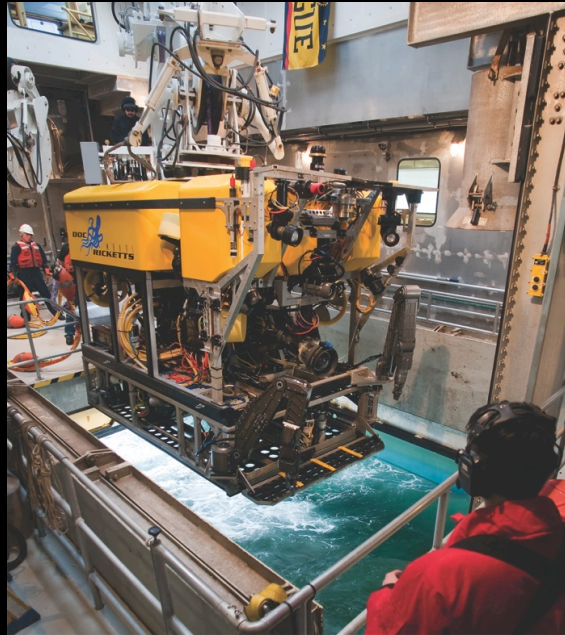
ROV Jason II



Remotely  
Operated  
Vehicles



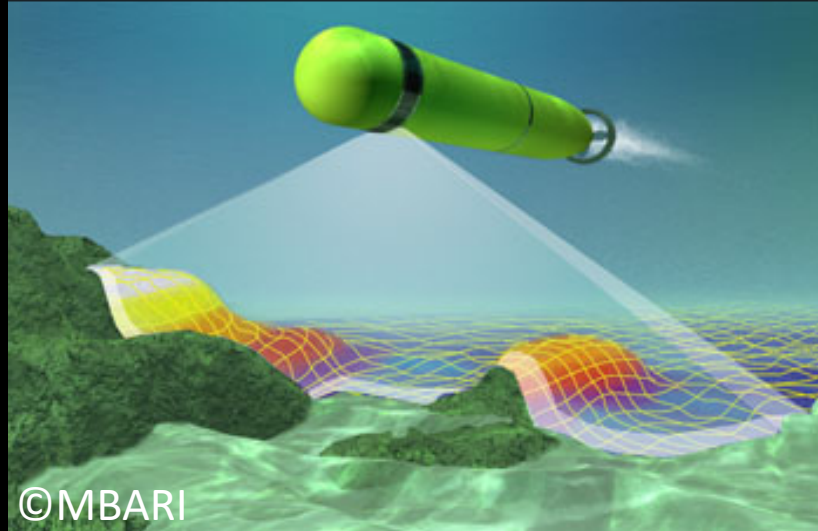
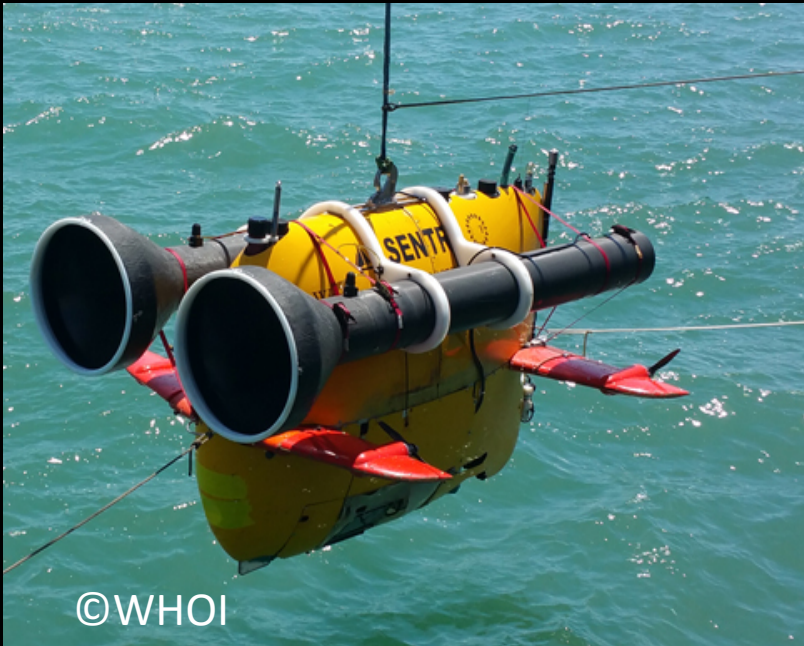
ROV Victor



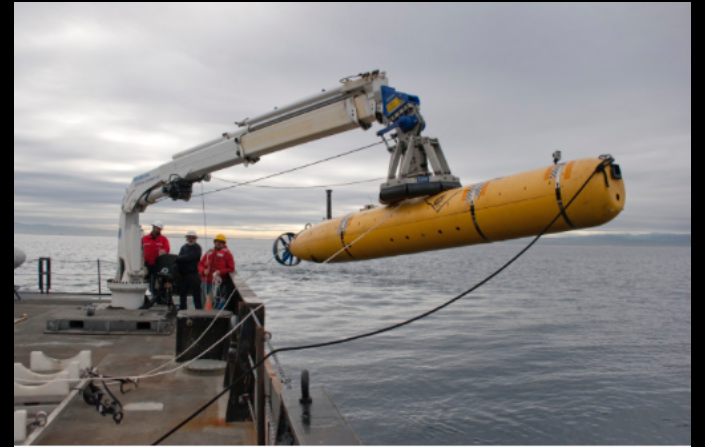
ROV Doc Ricketts



ROV Subastian

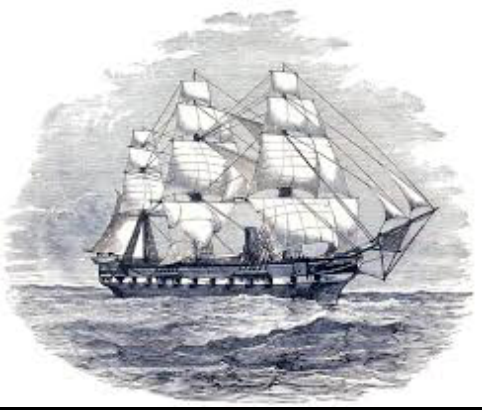


©MBARI



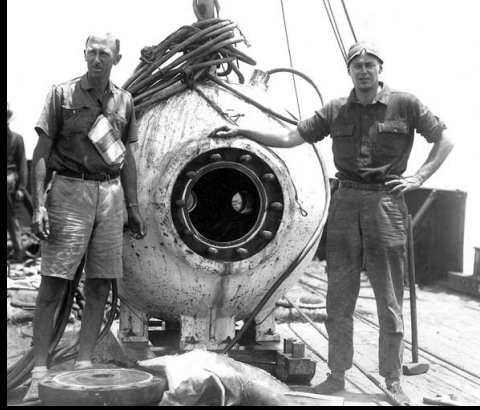
# Autonomous Underwater Vehicles

©WHOI



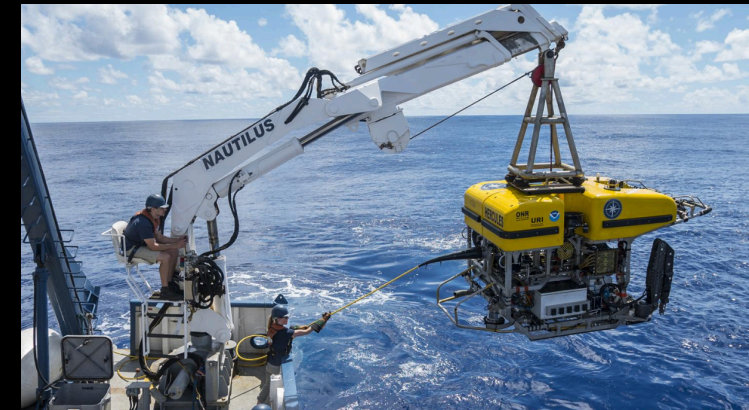
## Then

- Not open to all
  - Women not allowed onboard
- Samples and data not in a repository
- Not much metadata or global datasets
- Training was on the job



## Now

- Largely open to all
  - Telepresence
- Samples and data are (suppose) to be available
- Big data sets
  - Machine Learning
- Training programs



A wide-angle photograph of a sunset over the ocean. The sun is low on the horizon, creating a bright, horizontal band of light that filters through a layer of clouds. The sky above is filled with darker, textured clouds, and the water below is dark with some ripples. The overall mood is serene and contemplative.

The future of ocean exploration is YOU.

“We can only sense that in the deep and turbulent recesses of the sea are hidden mysteries far greater than any we have solved.”

- In *The Sea Around Us* (1951) by R. Carson. p. 133. Oxford University Press, New York.